CLAIMS

What is claimed is:

1. A fire control system comprising:

a LIDAR (laser identification, detecting and ranging) unit comprising a laser adapted to transmit a beam to a target, a collecting lens for receiving a beam returning from the target, and receiver optics comprising a multi-element detector array at a focal plane of the collecting lens, wherein for each element of the multi-element detector array there is a specific optical path in the atmosphere leading from the laser to the target and back from the target to the element; and

processor apparatus operative to measure signal fluctuations of an element of the multi-element detector array, and compute therefrom crosswind velocity of wind in the atmosphere.

2. The fire control system according to claim 1, wherein said processor apparatus is operative to compare signal fluctuations patterns of two or more elements of the multi-element detector array, compute a cross-correlation function, and use said cross-correlation function to define a wind direction of wind in the atmosphere.

3. The fire control system according to claim 1, wherein said processor apparatus is operative to compare signal fluctuations patterns of two or more elements of the multi-element detector array, compute variances of image centroid displacements, and use said variances to determine a turbulence strength value of wind in the atmosphere.

4. The fire control system according to claim 1, wherein said processor apparatus is operative to calculate turbulence strength changes and wind fluctuations insensitivity for optical paths longer than 500m by:

choosing fluctuations that act as refractive lenses with focal lengths on the order of hundreds of meters or more, wherein the fluctuations comprise eddy cells with a spatial scale of $l_w \sim \rho_0$ for weak fluctuations range, and $l_s \sim L/k\rho_0$ for strong fluctuations range (L – path range, k – wave number, $\rho_0 = (1.46C_n^2k^2L)^{-3/5}$ – coherence radius for plane wave), wherein corresponding spatial frequencies are $k_w \sim 1/\rho_0$ for weak turbulence and $k_s \sim k\rho_0/L$ for strong turbulence.

5. The fire control system according to claim 4, wherein an aperture D_r of said collecting lens and a size D_t of a beam spot of said laser on the target are increased to make the system

insensitive to small diffractive cells with spatial scale smaller than Fresnel zone $(L/k)^{1/2}$ for weak turbulence, and smaller than the coherence radius ρ_0 for strong turbulence.

6. The fire control system according to claim 4, wherein a field of view of each element of the multi-element detector array is reduced to $1/\mathbf{n}$ of the laser beam divergence, wherein **n** is the number of elements in the multi-element detector array.